WHAT IS CLAIMED IS:

1. An immersion lithographic system comprising;

a stage;

a semiconductor structure disposed on the stage, the semiconductor structure having a topmost layer of photosensitive material that has a thickness of less than about 5000 angstroms;

an optical surface; and

an immersion fluid disposed between the semiconductor structure and the optical surface, the immersion fluid in contact with the topmost layer of photosensitive material.

2. The system of claim 1 wherein the immersion fluid comprises water.

3. The system of claim 1 wherein the immersion fluid comprises a fluid selected from the group consisting of cyclo-otance and perfluoropolyether.

4. The system of claim 1 wherein the thickness of the photosensitive material is less than about 3000 angstroms.

5. The system of claim 4 wherein the thickness of the photosensitive material is less than about 1000 angstroms.

6. The system of claim 1 wherein the optical surface comprises silicon and oxygen.

7. The system of claim 1 wherein the optical surface comprises fused silica.

8. The system of claim 1 wherein the optical surface comprises calcium fluoride.

9. The system of claim 1 wherein the photosensitive material is a chemically amplified photoresist.

10. The system of claim 1 wherein the semiconductor structure is immersed in the immersion fluid.

11. The system of claim 1 and further comprising a radiation source.

12. The system of claim 11 wherein the stage is immersed in the immersion fluid.

13. An immersion lithographic system, comprising:

a light source for projecting light having a wavelength of less than or equal to about 193 nm;

an optical component arranged to received light from the light source, the optical component having an optical surface;

a semiconductor structure having a topmost layer of photosensitive material that has a thickness of less than about 5000 angstroms, the semiconductor structure arranged to receive light from the optical component; and

liquid containing water contacting at least a portion of the optical surface and at least a portion of the photosensitive material.

14. The system of claim 13 wherein the thickness of the photosensitive material is less than about 3000 angstroms.

15. The system of claim 14 wherein the thickness of the photosensitive material is less than about 1000 angstroms.

16. The system of claim 13 wherein the optical surface comprises silicon oxide.

17. The system of claim 13 wherein the optical surface comprises fused silica.

18. The system of claim 13 wherein the optical surface comprises calcium fluoride.

19. The system of claim 13 wherein the photosensitive material is a chemically amplified photoresist.

20. The system of claim 13 wherein the semiconductor structure is immersed in the liquid containing water.

21. The system of claim 13 further comprising a stage underlying the semiconductor structure.

22. The system of claim 21 wherein the stage is immersed in the liquid containing water.

23. A method for illuminating a semiconductor structure having a topmost photoresist layer, the method comprising;

providing a semiconductor structure having a photoresist layer, the photoresist layer having a thickness of less than 5000 angstroms formed on a surface thereof;

introducing an immersion fluid into a space between an optical surface and the photoresist layer; and

directing optical energy through the immersion fluid and onto the photoresist layer.

24. The method of claim 23 wherein the immersion fluid comprises water.

25. The method of claim 23 wherein the optical energy comprises light having a wavelength of less than about 450 nm.

26. The method of claim 23 wherein the optical surface comprises silicon oxide.

27. The method of claim 23 wherein the optical surface comprises calcium fluoride.

28. The method of claim 23 wherein the photoresist layer comprises a chemically amplified photoresist.

29. The method of claim 23 wherein the immersion fluid is in contact with a portion of the photoresist layer.

30. The method of claim 23 wherein the semiconductor structure is immersed in the immersion fluid.

31. The method of claim 23 further comprising a stage underlying the semiconductor structure.

32. The method of claim 31 wherein the stage is immersed in the immersion fluid.

33. The method of claim 23 further comprising developing the photoresist.

34. The method of claim 33 wherein developing the photoresist comprises immersing the photoresist in a tetramethylammonia hydroxide solution.

35. The method of claim 23 wherein the semiconductor structure further comprises a barrier layer formed over the photoresist layer.

36. The method of claim 35 wherein the barrier layer comprises a hydrophobic material.

37. A method of fabricating a semiconductor device, the method comprising:

providing a semiconductor wafer;

forming a photoresist layer over the semiconductor wafer, the photoresist layer having a thickness of less than about 5000 angstroms;

introducing an immersion fluid into a space between an optical surface and the photoresist layer, the immersion fluid contacting the photoresist layer;

patterning the photoresist by directing optical energy through the immersion fluid and onto the photoresist; and

removing portions of the photoresist in accordance with a pattern from the patterning step; and

processing the semiconductor wafer using remaining portions of the photoresist as a mask.

38. The method of claim 37 wherein the immersion fluid comprises water.

39. The method of claim 38 wherein the optical energy comprises light having a wavelength of less than 450 nm.

40. The method of claim 37 wherein the optical surface comprises silicon oxide.

41. The method of claim 37 wherein the optical surface comprises calcium fluoride.

42. The method of claim 37 wherein the photoresist layer comprises a chemically amplified photoresist.

43. The method of claim 37 wherein the semiconductor wafer is immersed in the immersion fluid.

44. The method of claim 37 further comprising placing the semiconductor wafer on a stage.

45. The method of claim 44 wherein the stage is immersed in the immersion fluid.

46. The method of claim 37 and further comprising developing the photoresist.

47. The method of claim 46 wherein the step of developing the photoresist comprises immersing the photoresist in a tetramethylammonia hydroxide solution.

48. The method of claim 47 wherein the optical energy has a wavelength of less than 450 nm.

49. The method of claim 37 wherein providing a semiconductor wafer comprises providing a semiconductor wafer with a layer of material deposited thereon, wherein forming a phototresist layer comprises forming a photoresist layer over the layer of material, and wherein effecting the semiconductor wafer comprises etching the layer of material.

50. The method of claim 49 wherein the layer of material comprises a conductive layer.

51. The method of claim 50 wherein processing the semiconductor wafer comprises etching the conductive layer into gate electrodes.

52. The method of claim 51 wherein each gate electrode have a minimum dimension of 50nm or less.

53. The method of claim 49 wherein the layer of material comprises a dielectric layer.

54. The method of claim 53 wherein processing the semiconductor wafer comprises forming trenches in the dielectric layer, the method further comprising filling the trenches with a conductor.

55. The method of claim 37 and further comprising forming a barrier layer over photoresist layer.

56. The method of claim 55 wherein forming a barrier layer comprises plasma treating an upper surface of the photoresist layer.

57. The method of claim 55 wherein the barrier layer is formed by treating an upper portion of the photoresist layer.

58. The method of claim 57 wherein treating the upper portion of the photoresist layer comprises performing a chemical treatment.

59. The method of claim 57 wherein treating the upper portion of the photoresist layer comprises performing an ion implantation process.

60. The method of claim 57 wherein treating the upper portion of the photoresist layer comprises performing a thermal treatment.